




# Chelmsford Amateur Radio Society

## Newsletter 600

 Follow @ChelmsfordARS

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**Next meeting: 1st March - 7.30pm, Oaklands Museum**

**Novel Antennas - Andy Chapman, G7TKK & Tony Gilbey, G4YTG**

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 Questions & answer(s)  
 Energy consumption  
 Skills Night February 2016  
 Canvey Rally  
 Miscellany  
 Booklet printing



February 2016



February 2016  
M0SHQ



March 2016  
G7TKK



### Club Nets - Tuesdays 20:00h Net Controller: TBD

#2 - GB3DA 8th March  
 #3 - GB3ER 15th March  
 #4 - 80m 22nd March  
 3.756MHz  
 #5 - 160m 29th March  
 1.947MHz

**Essex Ham Net**  
**Mondays 20:00h GB3DA**

Contact details for the newsletter: [editor@g0mwt.org.uk](mailto:editor@g0mwt.org.uk)

## Editorial

Hello again, and welcome to the 600th edition of this newsletter. Looking back at the archives on the Society's website, I see that the style has changed every time. I guess that is natural as, if they were monthly, there will have been about eight years between them, with different editors and production techniques. Indeed, they were May '74, Oct '82, Jan '91, May '99 & Oct '07. Of course those long standing CARS members will know this and the fact that all the copies are available on a CARS CD. I wasn't aware of that, but then I am a new boy around here—only having lived in Chelmsford for 22 years...

Talking of new boys, some old ones featured this month, with David Elwell, G4MUS renewing his acquaintance with CARS recently after a break of many years and Geoff, G7KLV being able to help out someone who had only recently discovered CARS' website. Also, Joe Dray, M6JNJ emailed to ask say that he hadn't been receiving his newsletters. For some reason, he had dropped off CARS radar but between them, Ray and John have managed to re-instate him on the distlist. Joe lives just 4 miles from the Greenwich Meridian in New Eltham, London and is also a member of the Cray Valley Radio Society. He is very active and enjoys the CARS Skills Evenings. Nice to know our membership is wide-ranging.

Peter Chadwick, G3RZP has again responded to an item in the last issue, with a warning about the "earthing" diagram I used in the antenna query article last month. The email chain between he and John, G8DET was worth repeating here and appears under the heading of Protective Multiple Earthing.

The SEARS Canvey Rally was well attended with an estimate of 4-500 punters, some of whom queued around the block to get into the event. I took along some stuff to make room in my shack and CARS made a small profit on sales, and with generous donations from Clive, M0GHH and Tony, G4YTG, it was worth while attending. Skills Night again showed that there is an appetite for 'a nose and a natter' with many different disciplines again being showcased. An ever-popular event, the presence of children is something that could perhaps be encouraged to help the future of the hobby. **Ed.**

## Dates for your diary

*Please note, the dates may be subject to change...*

19/20th March	British Science Week(end) Open Days at Sandford Mill
Mon. 21st March	Skills Night, Danbury Village Hall
Tue. 5th April	Meeting - '2MT Writtle - The Birth of British Broadcasting' - Tim Wander, G6GUX
Mon. 18th April	Skills Night, Danbury Village Hall
Sat. 23rd April	GX0MWT - Operating at Sandford Mill for International Marconi Day
Tue. 3rd May	Meeting - "Introducing Moon Bounce" - John Regnault G4SWX
Mon. 16th May	Skills Night, Danbury Village Hall
Sat. 28th May	Waters & Stanton Open Day
Tue. 7th June	Meeting - Table top sale
Mon. 20th June	Skills Night, Danbury Village Hall
Tue. 5th July	Meeting - "Innovantennas" - Justin Johnson G0KSC
Tue. 2nd August	Meeting - "Constructors Competition" - Carl G3PEM
6th/7th August	Sandford Mill BIG Weekend! An interactive historical extravaganza!
Mon. 15th August	Skills Night, Danbury Village Hall
Tue. 6th September	Meeting - "Millimetric Microwaves" - Chris Whitmarsh G0FDZ
Mon. 19th September	Skills Night, Danbury Village Hall





## Anniversary Issues

And here they are... Sort of.

**Chelmsford Amateur Radio Society**  
Newsletter  
ONE HUNDRED  
May 1974

**Next Meeting** The next meeting of the Society will take place on Tuesday 7th May at 7.30pm, at Marconi College, Arthur Lane, Chelmsford, with a talk on "QRPing, its pros and cons" by Roy Marter, G3PNE, and John Greenwood, G3JZD. It is surprising what facts have come out of this event.

**Next Committee Meeting** The "Wine-tasting", New Street, Chelmsford, at 7.30pm on May 22nd 1974. Committee please note change of date.

**Newsletter** As you will have noted from the heading, we have reached the 100th anniversary of the newsletter. It was first introduced in January 1964 for an experimental period of three months. I should think by now it has proved its worth.

To celebrate Guglielmo Marconi's 100th birthday, the Chelmsford Amateur Radio Society decided to establish a special event station in the Chelmsford area to commemorate this event. Roy Marter, G3PNE, offered to be the operator of his station, which was gratefully accepted. Between 150-2 metres, with some very interesting QRPing, and visitors to the station for their services. We also had very good coverage from the Marconi College, Chelmsford, and the station for their services. We also had very good coverage from the Marconi College, Chelmsford, and the station for their services.

To my mind, Marconi's greatest achievement was his work on the frequency around 300MHz, which was used for the Pope's Summer Residence. Most of you will remember the Pope's Summer Residence, which was built in 1952, and he had no difficulty to operate it.

**Old Newsletters** Items which are going back through the previous issues, had been re-printed. One item which had been re-printed, had been re-printed. One item which had been re-printed, had been re-printed.

**QRP Receiver** Best results are obtained with a rod of 100cm. The measured Q is 120dB.

**Chelmsford Amateur Radio Society**  
Newsletter  
ONE HUNDRED  
October 1982

**Next Meeting** The year has turned full circle again, and brings us to October and the Annual General Meeting of our Society. This is an important meeting to discuss the past year and to elect a new committee to run the Society next year. Following the A.G.M. will be the Junk Sale - 2pm to 4pm. We will try to sell as much junk as possible, but any not sold can be returned in November for the Christmas Clear out. Subscriptions are due at the A.G.M. and any nominations for officers of the Committee can be given to Roy G3PNE before the A.G.M. I look forward to seeing most members on October 5th at 7.30 pm, at the Marconi College, Arthur Lane, Chelmsford.

**Committee G3PNE** In the run up to the A.G.M. it is timely to say a few words to set the scene. In view of some open criticism on the air waves that the club is "not sufficiently amateur radio" I think we should consider the present and future constitution. Let us remind ourselves that the main objective of a hobby club or society is to create facilities in which group activity provides greater enjoyment and fulfilment than for individuals in isolation, the means is obvious, all members can make their contribution and I don't mean just their subscriptions, by friendship, providing help and information, right through to housing a committee member and beyond. Even criticism can be considered as a contribution but only if it is backed with constructive suggestions. Too often those who grumble about Clubs and Societies, especially the A.G.M., forget that they are administered mainly by volunteers who freely donate their time, effort and resources for the pleasure of others.

A.G.M. is very fortunate, we have a comfortable room for our meetings, a healthy size membership of over 80, a dynamic committee who provide more activities than the membership can cope with and an informative newsletter (congratulations on reaching 100 which arrives like clockwork each month).

Some of the long serving members of the committee wish to retire this year, others are willing to continue to preserve continuity, please give them the support they deserve nomination and your votes. We have got a jolly good Society, I hope you'll continue to enjoy it.

**Report on last month's lecture** Last month we had a slightly different meeting in that the only connection Arthur had with radio is when our lecturer Arthur G3JZD uses his amateur equipment to shoot at wire over trees on field day. Arthur started his talk by giving us a brief history of the low and some went on to show us examples of these made in different materials. Some photographs were passed around including one of an arrow made of metal which unfortunately hit a concrete wall and ended up like a six petalled flower! We

**Chelmsford Amateur Radio Society**  
Newsletter  
NUMBER THREE HUNDRED  
January 1991

**Next Meeting** The Annual Filtration Show. The next meeting of the Society will take place on Tuesday 19th January at 7.30pm, at Marconi College, Arthur Lane, Chelmsford, with a talk on "QRPing, its pros and cons" by Roy Marter, G3PNE, and John Greenwood, G3JZD. It is surprising what facts have come out of this event.

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March 2016 [www.g0mw1t.org.uk](http://www.g0mw1t.org.uk) No. 600

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Newsletter 600

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February 2016

March 2016 G7TKK

**Chelmsford Amateur Radio Society**  
Club Call Sign: G6MWT  
Chairman: John Bowen G6DET  
Treasurer: Brian Thwaites G3CVI  
May 1999

Newsletter No. 400  
AND STILL GOING STRONG

100 200 300 400

WELCOME TO THIS 400th EDITION OF OUR NEWSLETTER. AS YOU WILL SEE BELOW IT STARTED LONG AGO AND HAS DEVELOPED SOMEWHAT SINCE THE EARLY DAYS HOWEVER ONLY 12 OR SO DIFFERENT EDITORS HAVE TOILED MONTH AFTER MONTH TO BRING YOU UP TO THE MINUTE NEWS AND STORIES. THE FIRST NEWSLETTER WAS PRODUCED IN JANUARY 1964. THE CURRENT EDITOR ONE MICH TO MAINTAIN WE HOPE YOU AGREE WITH THE SENTIMENT EXPRESSED IN NO. 106 OF MAY 1974 THAT THE NEWSLETTER HAS INDEED "PROVED ITS WORTH".

**Chelmsford Amateur Radio Society**  
Newsletter  
ONE HUNDRED  
May 1974

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**Chelmsford Amateur Radio Society**  
Affiliated to the RSGB  
President: Harry Heap G5HF  
Secretary: Maryn Medcalf G1EFL  
Club Call Sign: G6MWT  
Chairman: John Bowen G6DET  
Treasurer: Brian Thwaites G3CVI

Newsletter No 500  
This Month's Meeting - Tuesday, 2nd October, 7.30pm at the Marconi Club.  
The Annual General Meeting  
500th Newsletter  
Yes, we are celebrating the 500th Copy of the CARS Newsletter.  
Also celebrating the 90th Birthday of CARS President, Harry Heap, G5HF.

90

Yes, it is the AGM again! Where do the months go! Come and have your say. After the AGM we have a Presentation & Demonstration of Echo-Link. See you there. There will be our usual good Raffle.

**Dates for Your Diary**

- Sunday 23rd September Science & Discovery Day at Sandford Mill 10am to 5pm. HF & VHF - G5HF
- Wed 10th October CARS Committee Meeting - Danbury Village Hall at 7.30pm. All welcome
- Sat/Sun 27/28th October Essex Repeater Group - AGM at Danbury Village Hall at 7.30pm. All welcome
- Tuesday 6th November CQ WVDX - 500 Contest - CARS are entering this Contest with Short CARS Meeting - Elaine Richards, G4LFM, Editor of Radio Life
- Monday 28th November Inter-Club Quiz Night at Dengie - with good food

Thanks to Denis, M6FMA & Joy for arranging the Postal Members News Inform Membership Secretary, Brian, G3CVI. Inform of any changes.

Club Nets: Tuesdays 8-9pm: (2nd) 145.375 (3rd) 28.375

Net Controller for October is CARS President, Harry Heap, G5HF.

## February Meeting - Amateur Radio Satellites - Steve Hedgecock, M0SHQ

Steve started by asking why anyone should want to track an object travelling at some thousand miles per hour. He said that he found it interesting in both the science and the ability to contact others at great ranges using only a handheld radio for power and a hand held aerial. He would illustrate how he does it and hoped we would be inspired to do the same.



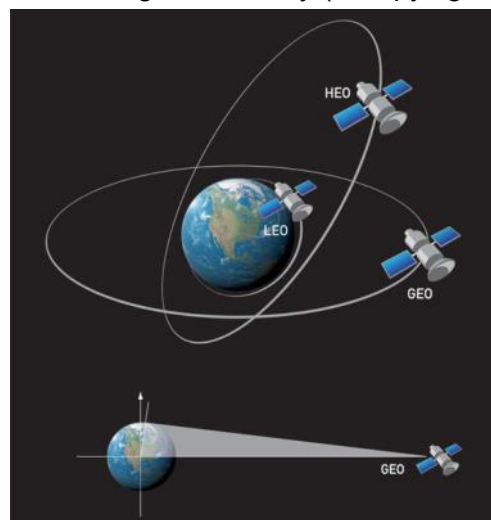
**AMSAT-UK**

AMSAT UK are the organisation that correlate most of the activities for the UK and their website is probably one of the best places to go to get up-to-date information. Books are available from their shop and also from the RSGB.

One of the early amateur satellites was OSCAR (Orbiting Satellites Carrying Amateur Radio) which was built in a garage by radio amateurs (but not the rock that put it up, Steve hastened to remind us!) It was a beacon transmitter and in service only four years after Sputnik 1 was launched. Steve showed us a model of basic FunCube unit which was enclosed within a 10cm cube.

Steve illustrated and explained the different orbits around the globe - some are geostationary (occupying the same spot in the sky relative to earth) and used for TV and commercial purposes, but the ones we are interested in a lower earth orbit (LEO) and circle the earth so close that they must inevitably pass overhead quite quickly. From any position on earth, they will appear at the horizon and pass overhead at different heights and/or angles of inclination and from different directions. These directions, heights, speed and time are available on several websites for any given location. These parameters are available on the ORBITRON site as freeware and a mobile phone Android app from AMSAT called DROID is also available. This will enable you to point your phone in the right direction and tell you where the chosen satellite is, or will rise. Steve says that he cheats using this method to avoid some of the hassle, but has to remember to update the data.

Steve reminded us of the Doppler shift that needs to be considered.



## LEO Doppler Shift

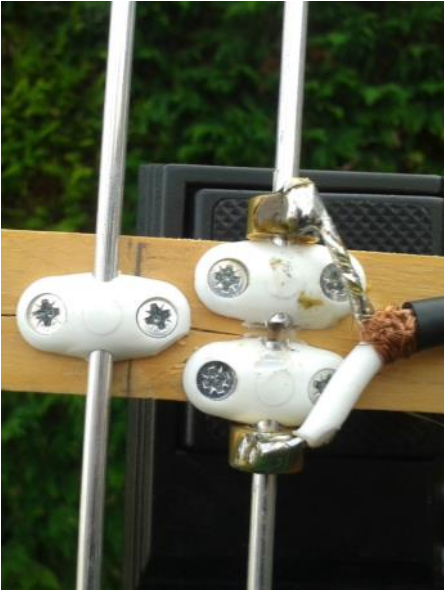
800 km / 497 miles, circular orbit

Band	15m	10m	2m	70cm	23cm	13cm	3cm
Freq. (MHz)	21.280	29.400	145.900	435.070	1269.000	2401.000	10250.000
Max Doppler	+/- 477 Hz	+/- 659 Hz	+/- 3.27 kHz	+/- 9.76 kHz	+/- 28.5 kHz	+/- 53.8 kHz	+/- 230 kHz



The frequency is higher when the satellite is approaching and lower when it is receding. This is not much of an issue for 2m FM, but is a real consideration for 70cm as seen from the table above. He then showed us the station setup he uses, which was simply an FT817 and a homemade beam aerial. He says a conventional collinear can be used, but only when the satellite appears at low angles. If it passes overhead, then the end of the antenna will present an effective null to the spacecraft.. OK to try on receive, though!





The aerial he made was a design from the internet which he "Googled" and constructed from 3mm aluminium welding wire. The other design he showed was a log periodic obtained from the 'States for about £120, as apposed to about £20 for the home brew version.

Steve used the SO-50 sat which operated on 70cm down and 2m up. It requires an access tone of 67Hz to open it like a normal repeater.

SO-50 Frequencies

Receive Frequency	Transmit Frequency	Offset Frequency	Offset Direction	Operating Mode	Name	Tone Mode	Tone
436.81500	145.85000		Split	FM	50 +4	Tone	67.0 Hz
436.81000	145.85000		Split	FM	50 +3	Tone	67.0 Hz
436.80500	145.85000		Split	FM	50 +2	Tone	67.0 Hz
436.80000	145.85000		Split	FM	50 +1	Tone	67.0 Hz
436.79500	145.85000		Split	FM	50 MID	Tone	67.0 Hz
436.79000	145.85000		Split	FM	50 -1	Tone	67.0 Hz
436.78500	145.85000		Split	FM	50 -2	Tone	67.0 Hz
436.78000	145.85000		Split	FM	50 -3	Tone	67.0 Hz
436.79500	145.85000		Split	FM	50 74	Tone	74.4 Hz

The best time to use the system is early evening and not at weekends, as it is only one channel and the whole of Europe are in competition to get in on the system. The talk raised plenty of interest and prompted many questions on subjects such as antennas, satellite operating, power limits, and peoples' experience of receiving Tim Peake on the International Space Station (ISS).

**Tony, G4YTG**



[Catch a falling star...](#)



Steve demonstrating the relative speed of fun cube in LEO...



And put it in your pocket!

..and in geostationary orbit?

## Protective Multiple Earthing (PME) - Peter Chadwick, G3RZP, Sen. Mem. IEEE

A very interesting [February] Newsletter.

Just one point of warning re the "Antenna query". If your house electricity supply is a Protective Multiple Earth type, bear in mind that a supply line fault can lead to a large fault current when an external earth is connected in parallel with the mains earth. The other year, a bad aluminium to copper joint in the neutral supply to my house meant that turning on one ring of the electric cooker dropped the supply by 40 volts and the neutral rose to 40 volts above earth - despite being connected to a 4 foot earth rod at the pole in the garden. Fortunately, my house is wired on the TT system, where the neutral is isolated in the house from the earth conductor.

**Vy 73, Peter, G3RZP**

Peter,

You have a very valid point – having said that I do not really understand PME! The Late Geoff Mills, G3EDM gave a lecture on the subject to CARS many years ago – it threw up as many problems as he was telling everyone about!

Peter Graves, G0KSJ found some years ago his fridge, freezer "running like hell". When he switched on the kitchen light it was "like a photoflood lamp" until it blew. He had 415Volts on the house and it blew everything which was connected at that time. The Electric Company did pay up though.

**John, G8DET**

*(Peter Graves then came up with the story of his high voltage experience).*

Hello John,

This event is now some twenty years old, but my memory of it has mostly remained.

On waking up at about 7 a.m. I noticed that the illuminated display on my alarm was varying from bright to completely dark. I decided to get up and get my analogue multimeter out; by this time, I had also switched on the mains powered lighting. The lighting flickered badly and varied from dim to super bright, the meter needle shooting up and down the scale at high speed.

The next thing was to isolate everything that I could thought could be live and while doing this, the lights failed altogether and the meter read zero volts.

Later that day Eastern Electricity arrived and dug three holes in the pavement about 8 houses apart (25 houses in my road). White metal rods about 2.5 cms dia. and 3 metres long were hammered into the ground, and these were connected to the existing earth wiring. I had to replace the mains transformers in all small radio devices and alarm clock. Fridge/freezer and central heating carried on working.

George Curry(?), now silent key, and who had been a linesman for the electricity company, said there was no way that this three phase supply could lose its earth, but changed his mind by the next meeting having produced a very elaborate coloured drawing.

All my costs were paid by return of post!.

**Peter, G0KSJ**

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## Protective Multiple Earthing (reworked PW article)

This article is aimed providing guidance regarding the domestic mains electricity installation that applies to vast majority of amateur radio installations: some of the points made may not be applicable in every case – for example, an amateur station in a block of flats.

The concept of Protective Multiple Earthing or PME developed from the requirements for a good electrical earth for safety reasons. At one time, the distribution from the substation was in armoured or lead sheathed cables, frequently with cast iron joint boxes, and although this provided a low resistance earth when newly installed, ground movement and corrosion in certain types of soil could make the earth resistance high. While metal water pipes were universal, using them as an electrical earth in a house provided a safety earth, and indeed, the individual house feeds might not even have an earth.



Modern construction with plastic water pipes, combined with the difficulties that can exist in getting a good local electrical earth (sandy or rocky soil for example) mean that the provision of an earth back to the sub-station, connected to earth at a number of points is desirable. However, the neutral of the mains supply is also at earth potential, and provided it is connected to earth at several points along its run, it can act as the earth as well.

The intention of PME is that a *protective earth* is connected to all exposed metalwork within the house, so that no potential can exist between any pieces of touchable metalwork. There are three basic systems that may be found in the UK, known as TN-S (Fig 1), TN-C-S (Fig2) and TT (Fig3). The first T is from the French for earth (Terre), N is Neutral, S is Separate and C is combined.

In a TN-S system, the *Protective Earth* is generally the metal sheath or armouring of the incoming cable, and this is bonded with suitable size conductors to metallic water pipes, gas pipes, central heating, metal sinks etc. From the radio amateur's viewpoint, the 'earth' may well have a lot of noise on it, and although rare, it can happen that a JCB bucket can 'skin' the sheath of a cable effectively cutting the earth. Similarly, in overhead distribution systems as found in rural areas where separate conductors are run, a falling branch can similarly break the protective earth while leaving the main supply unaffected.

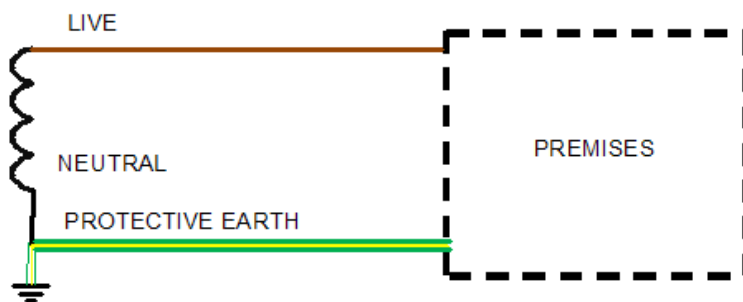


Fig1. The TN-S earthing system

The TN-C-S method is shown in Fig 2. Here, the neutral is earthed at more than one point, but at the entry of the supply into the house, a link connects the earth wiring of the house (including the metallic water pipes, gas pipes, sinks, radiators etc) to the neutral conductor. Incidentally, if an outside water tap is provided, an isolating length of plastic pipe is required – the reason for which will become apparent.

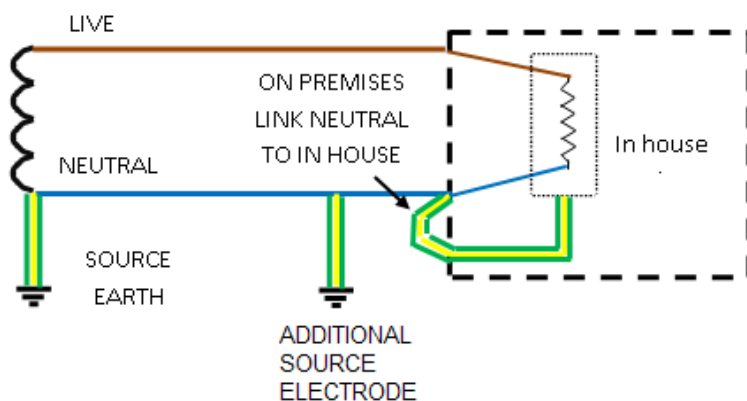


Fig 2. The TN-C-S earthing system

As all metal inside the premises – the dashed lines in Fig 2 - is connected together, even with a potential drop along the neutral conductor to the additional source electrode, everything in the premises is at the same potential and no electrical shock hazard exists: the premises are in what is known as the 'uni-potential zone'.

In the situation shown in Fig.3, the 'earth' wiring, water and gas pipes, central heating etc. and neutral in the house will 'float' up in potential above real earth to more or less the potential of the live conductor, since the house load resistance is relatively low – maybe as little as 5 ohms if the cooker, immersion heater, dishwasher, washing machine etc. are all on at the same time. But because there is no outside earth in the premises, there is no shock danger – the premises are all at one potential.

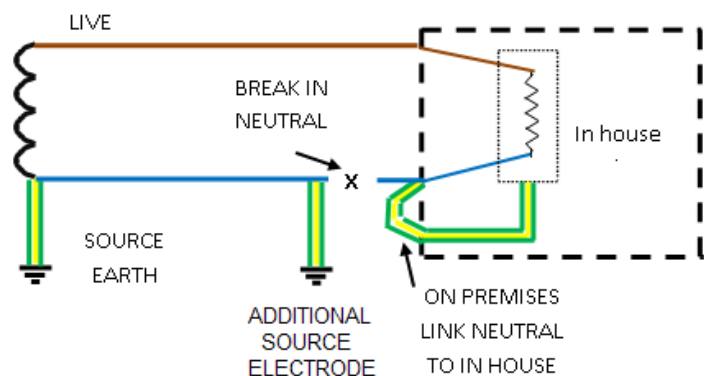


Fig 3. The TN-C-S system with a broken neutral conductor



However, someone, for example, standing outside and connected to earth who reached through a window to touch a radiator could indeed get a fatal shock. Because it needs to be impossible to touch a conductor within the uni-potential zone is why an isolating section of plastic pipe is needed to an outside water tap.

The major difficulty appears with an amateur station and an external earth in this situation. The amateur station needs an external earth for best operation from the EMC viewpoint, and is, as is usual, the metal case also connected to the earth pin of the mains plug, the current path becomes as shown in by the red arrows in Fig 4.

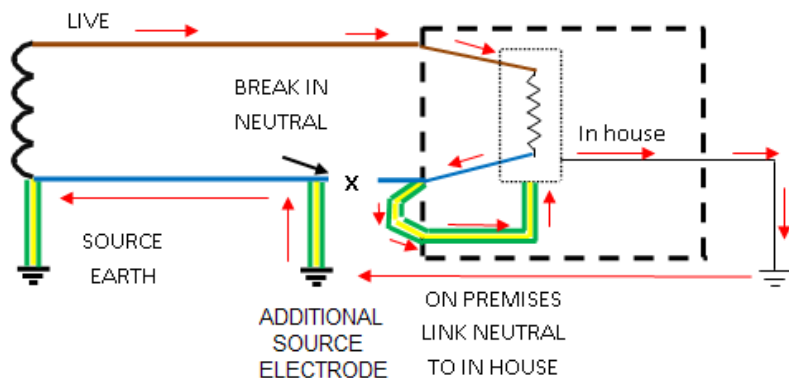


Fig 4. The TN-C-S system with a broken neutral conductor and external earth brought into the uni-potential zone

As the house load can be up to 50 amps, this current has to flow down the flexible lead from the mains plug to the rig and from there to earth. The result may well be a fire.

One way to avoid this is to have the RF earth bonded back to the incoming neutral at the neutral to premises earth link with a suitably large conductor – 25mm<sup>2</sup>. To avoid injecting mains noise into the RF earth, this conductor should be passed through a number of ferrite rings or clip-on suppression ferrites. This is something that really requires the services of a competent electrician.

Better, when possible, is to go to a T-T system, where a local earth is provided, and no connection is made to the neutral.

Fig 6 shows this, but an RCD (Residual Current Device) is then needed. The usual RCD trips at 30mA, but in some circumstances, such as lot of equipment with mains filters or where a variable speed drive is used for motors, a 100mA RCD may be necessary. (RCD's feeding variable speed motor drives can see unbalanced harmonic currents, especially when DC injection is used for braking). Even a 100mA RCD can give tripping problems if there are induced RF currents in the wiring, either to an outside overhead feed or to internal house wiring. The RCD should be tested every few weeks to make sure it has not jammed – after a long period on being in the 'ON' position, this can happen. It should be noted that for caravan parks, it is NOT permitted to bond the neutral to the earth wiring inside the caravan or the metal work, and a TT system with an RCD is required.

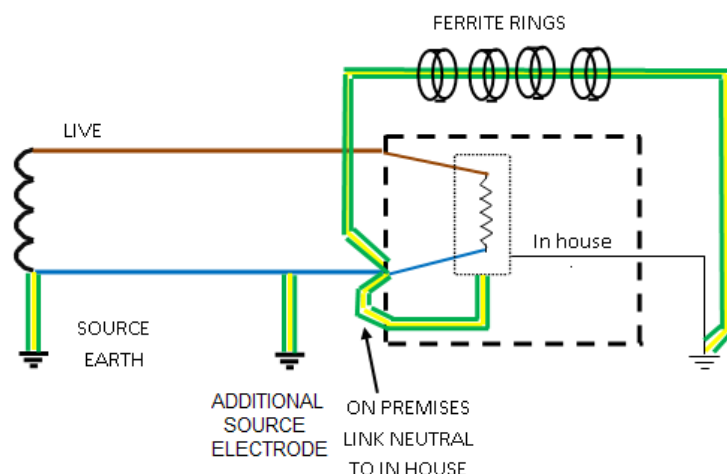


Fig 5. The TN-C-S system with an added external connection to the earth

Moving to a TT system in this way does require a competent electrician, who will have to ensure that the earth resistance is adequately low. If the RF earth is good, it may suffice, but would need the connection to be 25mm<sup>2</sup> as a minimum.

Although it is not always recognised, a consumer does not have to have PME, although not having it means that it does become

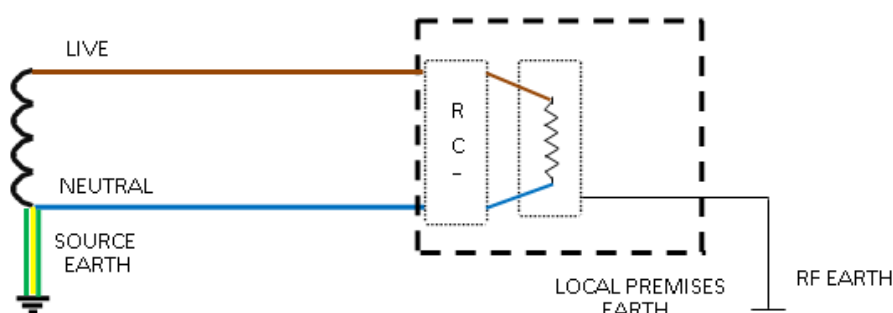


Fig 6. The TT system with a local earth and no connection to the neutral



necessary to go to a TT system with the possible problem of getting (and maintaining) an adequately low earth resistance – corrosion can occur, and an inspection every so often is a good idea.

It is not always possible to get away from PME – for example, in a block of flats - and then an outside antennas need to be placed where touching, for example, a support pole connected to the coax outer via the antenna boom is impossible – usually meaning a clearance of at least 6 feet. In such a case, getting a good earth anyway may be a problem, and it might be that only the water pipes are available. Each situation tends to be somewhat different: the author has almost the best situation with a wet heavy clay soils and a TT installation – but a 100mA RCD that trips with RF! But that, as they say, is another story....

---

*And finally, another follow-up from Peter...*

John,

I was digging in the bottom of the filing cabinet yesterday and found a copy of a letter from the IEE (as it then was) dated 1990 to Professor Peter Saul, G8EUX, who had stirred them up with my article in Rad-Com about that time - and the RSGB presentation at a Land Mobile Radio Conference that I gave. They had referred the matter to the Electricity Council who said that bonding the radio earth to the mains would be acceptable if the bonding could stand **65 amps** of fault current safely, and the alternative of TT system would get away from the problem.

Which was exactly what I had suggested.....The whole business of PME was brought to my attention by G4LDL, who at that time worked on HV distribution for Southern Electricity. Although retired, he still does contract work for them... but he checked my articles for accuracy.

I much prefer a TT installation!

**Peter, G3RZP**

*And my point? I understand all the issues raised there in the PME article, but when I referred to the rig's mains earth, I guess I was considering one of two possibilities - either one or all of the pieces of kit will have a genuine chassis earth connected via the normal three-pin mains plug (high voltage linear?), or it will have capacitive coupling via the 13.8V supply if it is d.c. powered. My house was built in the '30s and has an overhead 2-core mains supply; it had a ground rod that was connected via a thin stranded copper wire that long ago corroded away to nothing, although there was an earth from the (ancient, original) fuse box connected to both the rising water main and gas meter.*

*The water and gas mains were both upgraded to plastic in recent times, so the earth was about as much use as a chocolate fireguard. A couple of years back we updated the consumer unit with a plastic one. (Yes, John, a plastic one!) After having the work certified and the "engineer" raising some questions about the house earthing, UK Power Networks came out and connected the house earth to the neutral at the consumer unit in lieu of there being any other sensible earth, and all were happy.*

*My 'shack' is in a first floor room at the front of the house and some while ago I ran a long wire from there to the end of the garden via suitable insulators. When I tried to couple into it, I just couldn't get a sensible match and the noise level was appalling. I did try a combination of water and central heating pipes to see if I could get something that looked like a counterpoise, but it was pretty hopeless. The effective RF impedance was way too high to be useful as an earth and far too lossy to be useful as a genuine counterpoise, so I eventually scrapped the notion and put up some different wires in the garden where I could get a decent ground (well, a better one, anyway).*

*At one point, I hammered a few standard Screwfix copper-plated steel earthing rods into the ground near the shack I was using in the garden at the time. The Kenwood TS-430s manual I had recommended fitting several within a metre of each other. I measured the impedance between two of them and, if memory serves me correctly, I read something in the region of 10-20Ω. They are not there now, as I don't use the shack and I re-landscaped the garden area, so I can't re-check how they have changed. Actually, I was surprised at how easy it was to pull them out with a large pair of grips and to see how much they had bent in the process of being driven in. It was also obvious how much of the copper had been scraped off, too, so I don't suppose they would have been effective for very long, if left to their own devices. **Ed.***

## Chelmsford Scout Amateur Radio Fellowship

Christopher Chapman, G0IPU

As some of you may have noticed I'm quite involved in the Scout movement and in that vein I'm also promoting amateur radio to the young by means of the Chelmsford Scout Amateur Radio Fellowship (Chelmsford ScARF). We were formed back in 1999 after a Chelmsford and district Scout event called JOTA (Jamboree On The Air). Also, as a group of radio amateurs in the Scout movement, we visit Scout events like the Essex International Jamboree (EIJ), a four yearly event where 10,000 visiting scouts attend; some, not all, visit the radio shack to pass greetings and messages to the amateur fraternity. Outside the Jamboree the group visit Scout groups in the district of Chelmsford and, on occasion, the County to do a little electronics construction in the form of an AM radio. This introduces amateur radio and the idea that Scouts also can get their own licence to operate. Below is one Scout's newsletter article that I have been given permission to reproduce here.

### "Tuned In"

"On 19th November last year, Danbury St Cleres Scout troop was treated to a very interesting session about radios. The evening started with building our own radio.

To help us out we had 5 Scout leaders who had just come back from building thousands of radios at the recent Scout Jamboree. They showed us where each component went and which wires we had to connect. We used soldering irons to melt metal on to the end of the components to keep them intact. Once everything had been soldered we were given a set of headphones to test them out. They all worked and I still use mine today! It picks up just about anything!



After that, we all had a go on the personal radio station belonging to one of the leaders. We all had a proper conversation with someone who had picked up his radio signal. Overall it was a great night and an amazing experience and I would love to do it again and learn even more about how the radio works. It was fantastic and we all left with a working radio and a free set of headphones!"

**By Gabriel - 1st Danbury Scouts**

As you can see, a very busy evening, but great fun. Thank you 1st Danbury Scouts for the kind permission to use your newsletter article and well done Gabriel for writing it.

*Not being familiar with Danbury St Cleres Scout group, I wondered if it should be Cleres, Cleres' or Cleres's so I looked it up via Google and found, quite by chance, a link to a 1940 wartime copy of The Brentwoodian, a magazine of The Brentwood school. The Scouts were one hook, and also the St. Clere family were mentioned in an article about Dan-*



bury, so I idly paged through it. [The Brentwoodian](#) was founded in 1557, so our newsletter is nothing to write home about! Anyway, I found this item that had no explanation at all, but I liked it... **Ed.**

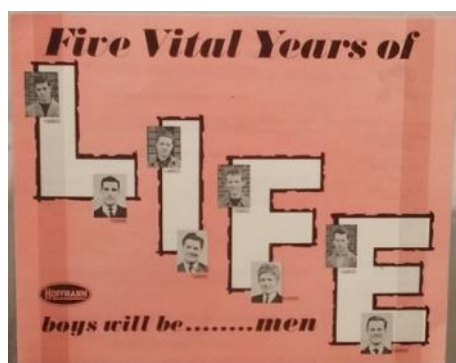
### David Elwell MBE, G4MUS (formerly G8CV1)

At the February meeting, tea was served downstairs in the main museum foyer and John, G8DET suggested that members have a look at the displays while they were down there. As it happens, David, G4MUS found a picture of himself in one of the displays. It was in a programme that was obviously used as publicity material by the Hoffman company.

We thought it would be good to ask David a little about himself. So; here goes:

Member of CARS during the late 60's and 70's, originally as an SWL until, in 1969, as G8CVI after passing the RAE in Chelmsford. I obtained G4CVI after passing the Post Office Morse test in 1981. Until Jan of this year, the last time I attended CARS was at the Marconi College in late 1981 or early 1982.

My working life originally started with an electrical engineering apprenticeship at the former Hoffmann's factory in New Street, Chelmsford, ultimately involved in 11KV systems and also Industrial Electronics.



My photos as

an apprentice are contained in a programme which is displayed in the Hoffmann exhibit at Oakland's Park Museum (I'm officially a museum piece).

In 1979 I joined the former "Pye Telecommunications Company" as an Area Engineer based in Cambridge for many years, working on installation and maintenance of VHF UHF and HF radio equipment for Fire, Police Ambulance, Marine, Military TA, aeronautical and industrial customers in East Anglia.

In 1981 I joined Essex County Fire Brigade as it was then known (now Essex County Fire and Rescue Service) and was the Communications Officer (Operational Telecommunications) until my retirement in June 2015. I was responsible for all radio systems, ICCS (Integrated Communications Control Systems) Radio Control and 999 telephony systems etc.

During my career I attended RF safety and training courses etc., at the Post Office Tower London, Emley Moor Yorkshire TV mast, (ascending to over 1000ft.) Membury TV mast near Hungerford, M4 Great Bromley radio mast (360ft and a former WW11 Home Chain mast structure).

For years I was involved with Marconi's "Tim Wander" on a Fire Service/Home Office sponsored project and trail of REDS - a Fire Service Breathing Apparatus Telemetry system which was trialled at many locations including Tilbury Power Station, Stansted Airport, holds of ships and other subterranean locations to prove penetration of the UHF spread spectrum solution into difficult Fire RF locations.

"i."

WE had been informed through our secret service that the enemy were perfecting a weapon for projecting gamma-particles which would cause our tanks and guns to fuse and disintegrate. I was instructed to find some means of combating this menace. I had decided that if I could find the value of the square root of  $-1$ , and if I could, in some manner, multiply these gamma-particles by this number they would necessarily be turned through a right angle and so be deflected from our lines. I decided to discover the value of "i" first.

By certain means, which are far too technical to state, I was projected into space along a rectangular hyperbola whose origin lay on the earth's surface and whose asymptotes were horizontal and vertical lines through that point. A long time passed before there appeared on my left a long straight line which I seemed to be approaching rapidly. I realised it was the asymptote to the curve on which I was. Unfortunately before I knew what was happening my left leg, which had been hanging over the edge of the trolley, was crushed between the side of it and the asymptote. The trolley, receiving a sudden blow, toppled over and projected me into space. I fell "from morn to noon, from noon to eve, a summer's day" before dropping down upon a horizontal plane. I rose up a trifle dazed but miraculously unhurt and was immediately surrounded by a queer tribe of men brandishing weapons and menacing me in no uncertain manner. It appeared they had mistaken me for an enemy invader. After pacifying them I asked them where I had fallen and they told me it was a land called Argandigram, not Lemnos as I might have supposed. I told them my mission and they instructed me to walk along a certain straight road until I turned through a right angle. Then, they said, you will find the value of "i."

After many trials and tribulations I managed to return home, carrying the value of "i" locked in a Chubb safe, expecting to be hailed as a hero and acclaimed as the saviour of my country.

But we had won the war ten years previously. The enemy tried out his weapon. That same evening, however, a magnetic storm occurred. The gamma-particles were deflected through  $180^\circ$  and destroyed both their generator and their masters.

J.E.F.



I was awarded the MBE by HM the Queen in 2003 for services to Fire Service Communications.

A National Blue Light Association, British APCO (British Association of Public Safety Communications Officials) was formed in 1985 to provide networking and Telecommunications information exchange between blue light and related services. I joined from the outset and have the membership no. 001 as the first person to join, and am a life member of that organisation.

Over the years, emergency service telecommunications have changed considerably - originally occupying spectrum in the Band 2 broadcasting spectrum. As a result of the WARC (World Administrative Radio Conference) in the 70's, Fire moved to low band 70M/80MHz and Police moved up to high band 146/154MHz.

In recent years, all blue light services have moved to Airwave (TETRA) which provides GCHQ encryption level communications (TEA2) nationwide, with extensive Talkgroup capability for all blue light services and interoperability between all blue light services and category 1 responders.

Fire continue to use 457MHz UHF FM for incident purposes, partly due to the UHF penetration capability into buildings. Many repeaters are in use for this facility at strategic high risk locations, such as airports, major shopping centres, prisons petrochemical industries, etc.

The Airwave contract is coming to an end and the Government have been out to tender for ESMCP (Emergency Services Mobile Communications Programme).

As a direct result of ESMCP, it means in future ALL blue light services will effectively use 4G mobile technology with suitable (alleged?) resilience. Having attended many Incidents where there has been both user service radio congestion and cellular loss and, having attended a London meeting on July 7<sup>th</sup> many years ago and experiencing the cellular congestion, I am NOT convinced this is going to be a resilient solution, as it will be shared with the public usage (albeit with some form of priority).

From the Amateur Radio perspective, my early years as G8CVI were spent on 2 metres and 70cm, as that is all B class licensees were entitled to at that time. I was involved in the group that set up the first Essex repeater, GB3ER, and I installed the first GB3ER aerial system on the former Marconi Tower in Little Baddow Road. See also <http://www.essexrepeatergroup.org.uk/history.htm> inaugural minutes.

John, G8DET was also present at the inaugural meeting (not minuted).

I have not been very active in recent years partly due to work commitments; however, since retirement I have spent more time on the hobby. I have mainly used vintage equipment including Clansman ex. military equipment, Yaesu FT101ZD, various modified VHF/UHF PMR equipment and some old home brew kit. Operational capability of HF, 2m (FM and SSB), 70cm, 4m, and 6m. Most aerials are homebrew. I also have digimode capability

Home QTH Hullbridge, Essex, approx. 200m from River Crouch - not a good VHF location!

73, de David, G4MUS



## Questions and answers

*Chris, G0IPU recently received an enquiry via the website:*

Good afternoon.

I have been searching for information on the Marconi HR 11 FSK Dual-diversity receiver, and have just spent a wonderful excursion reading all about the work restoring the HR 24 ISB Rcvr. For this I must thank you.

You see, I am now 72 and your story has taken me back to my early days in the RAF when I worked (yes, some of us did work) at RAF Salt pans in Colonies & Protectorates of Aden (now Yemen). I was trained as a Ground Wireless Mechanic (and later as a Fitter) so it was no surprise when I ended up there in 1962 – 1964.

In the receiver site we had 10-12 HR 24s, 2 HR23s and about 6 HR11s for the FSK circuits; we also had an early Racal RA-17 for monitoring purposes and (unofficially) for the BBC World Service and Radio Luxembourg (back then on 6.090 Kc/s). The aerial-farm was massive, and sported an array of rhombic antennae from the site all the way to the coast road. I do recall that these were supported on sectional masts known as 'tin-cigars' because of their shape (Type-43s if I recall). These had an allergy to the salty atmosphere and tended to rot (rust) from the inside. It was quite entertaining to see one of them 'explode' and collapse in a heap (within the guy-radius), usually dragging the rhombic-pair and the other three masts after it. We knew we really shouldn't laugh, after all it would take the riggers many hours to replace and re-rig the antennae – if 112°F heat and no shade.

My claim to fame was diagnosing a supposed 'fault' with the AFC circuits. I say supposed, because it turned out to be an error introduced by an ill-designed modification. The AFC circuit, usually very effective, would actually cause the receiver to 'drive-off' the frequency in certain circumstances. It was a simple wiring error, but well hidden.

This leads me to other reason for writing: I am trying to recreate a receiver of this vintage from scratch. I 'found' in my shack a Marconi AFC unit, still its original packaging, and immediately decided to incorporate this into my re-creation. This is where Google led me to stumble onto your website and my journey down memory-lane began – that was over 3-hours ago! I am looking for the AFC circuit diagram to permit me to incorporate the unit:

Can anyone supply me with that part of the diagram?

Once again, many thanks to you all and may I say a huge 'well done' to all involved; it is so good to see the HR24 resurrected !

Kind regards to you all, Graham

73 de G4FUA – IO81RM

*And the following response was obtained:*

Dear Graham,

Give me a little time and I can help you!

I am a volunteer at Sandford Mill, the industrial store of the Chelmsford Museum where the HR24 is on display.

In the late 40s - early 50s I was in the receiver design group at Marconi's. I did all the detail design work on the front end of the SF and Osc. circuits of the HR10/20 receivers. No, I didn't do the AFC circuitry!

Give me a few days and I can get the circuit you want.

I can send you a photo-copy.

Are you still at (address snipped)?

Regards,

Geoff Lovegrove, G7KLV

*As John, G8DET points out, This goes to show what talent the club harbours—past and present. Ed.*

## Wasteful energy consumption?

At the January meeting John, G8DET mentioned use of a Efergy energy meter and his findings that several appliances in his house were not exhibiting unity power factor (where the current and voltage are in phase). These meters use clip-on sensors to measure total supply current (essentially current transformers) and make a bold assumption that your power factor is, indeed, unity and that the voltage supply to the house is within the National Grid specification. They won't be a million miles off, but they are still not very accurate. Most of the smaller plug-in units that are designed to measure individual, or extension lead consumption can be far more accurate as they sense the mains voltage as well—often taking into account the waveform distortion and harmonics. Anyway, clip-ons give you an idea of consumption.

On average household has been using about 2500 kWh/year in terms of electricity. That's not a huge amount by some people's standards; about 6.8kWhr/day, but you do wonder where it all goes. It would seem intuitive that the heavy power users like washing machine, kettle, immersion heater, tumble drier, hair drier etc. would be the main culprits, but it may not be that simple as their use tends to be sporadic or periodic on a weekly, rather than daily basis. Let's try some calculations:

**Kettle:** 1 Kcal (4184J) is needed to raise 1Kg water by 1°C. My kettle takes (typically) 0.7 litres of water to make tea for two. Typically, again, we may have seven pots per day and that doesn't vary much as we are now retired and one day is pretty much the same as another. If the water comes from the tap at (approx.) 10°C then  $7 \times 0.71 \times 90^\circ \times 4184 \times 365 = 673\text{MJ} = \sim 187\text{kWh/year}$ . Even if you factor in 10% (say) for over-boil and household wiring copper loss,  $\sim 200\text{kWhr/year}$  is not a huge amount.

**Mara's hair drier:** Why would I need one? This is rated at about 1.5kW and at (say) 10 mins usage per day, the total would be about 91kWh/year. That's not excessive either.

**Tumble dryer:** Say 2kW for 2 hrs per week during three (wet) winter months? 52kWh/year? Even if it were used each week (and it isn't) that would still only be about 210kWh/year. We're still not there yet...

Usage for the other appliances (e.g. heaters, washing machine, vacuum, tools, lights etc.) is harder to estimate, but some things are more easily measured... Overnight, our house runs the following appliances: cordless phones, PIR security lights (2 ea.), timers (4x), router, printer, PVR & TV (all set to "off" but still consuming energy), TV aerial amp; bedside, cooker and microwave clocks; fridge/freezer and one Ikea LED lamp that has its off switch *after* the ac—dc converter!

A few years ago I had a couple of the cheap clip-on meters that were issued free by British Gas and E.On and the novelty of using them soon wore off, but not before I discovered something that astounded me at the time: After noticing the household "idle" power was higher than expected, I saw that typical (official) metered overnight consumption was  $\sim 1.4\text{kWh}$  in 9 hrs. These items don't just run at night so, extrapolated to 24hrs/365 days, that gives  $\sim 1360\text{kWh}$  per year. That is true power as the mains meter only responds to in-phase current (or should do!) As an example, over the last Christmas period we were away, with the cooker, microwave, printer, router and bedside clock turned off, but with one LED light and LED Christmas lights on a timer. Even then, power consumed for that period gave an equivalent usage of 730 kWh/year!

So: something over half of the historical annual energy usage is consumed by appliances that we don't really want to do without, that either can't be switched off or are pretty damned inconvenient to do so, and that don't really contribute much to our daily needs when we are not using them. It used to be about 2/3 of the annual consumption before I changed some of the appliances in the house.

One of my PCs takes about 4 watts when shut-down as the PSU stays running, with the motherboard just waiting for you to switch it on via a sense switch, and three of our radio/music systems would also consume similar power for similar reasons if I didn't switch them off at the wall. It's a sobering thought that my household is pretty good by some current standards... And what about those PCs you leave running 24 hours in the shack (for whatever reason)?

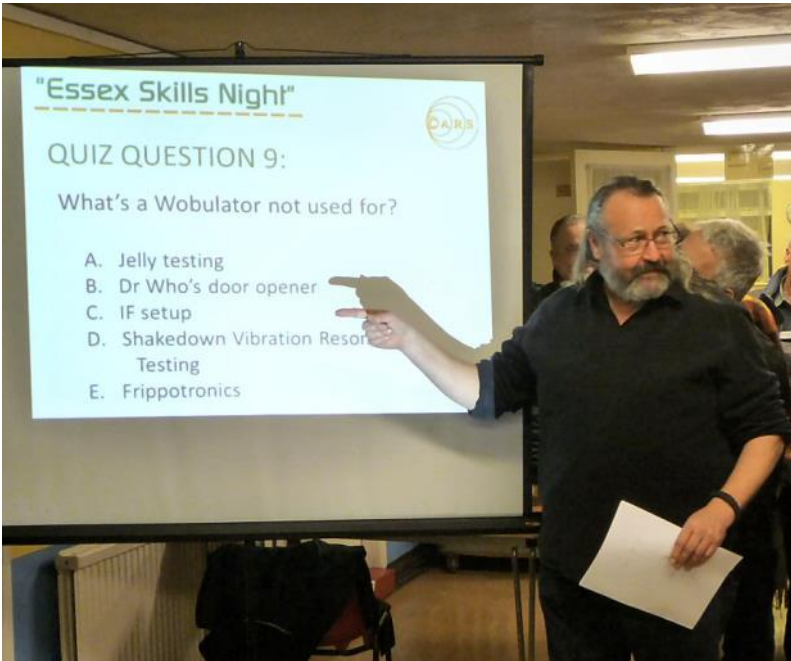
**Ed.**



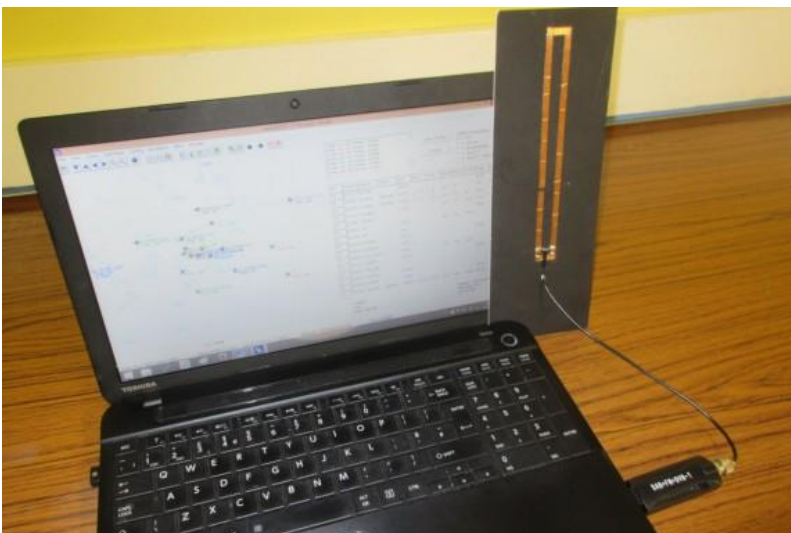


## Skills Night—February 2016

This was well attended as usual, with the usual practical and pragmatic demonstrations and teach-ins.



Thanks to Essex Ham and CARS websites for the pictures!







### Canvey Rally—Feb 2016

Thanks to Kristian, M0SSK for the pix...





## Microwaves 101

Do you know about this website? [microwaves101.com](http://microwaves101.com) is an excellent source for calculators, downloads and other information. It's not just about microwaves and one section of their site I have always liked is their Microwave Mortuary. There are umpteen pictures and background stories of heroic failures that have happened in the electronics world—including some amateur radio stuff. Some of the submissions over the years have been removed as bosses of "big" companies have found out that their products have been represented, but mostly it is just the result of ham-fisted (no pun intended) or idiotic technician work and poor installations that cause the issues. Blown-up test equipment features a lot and, boy, is some of it blown up...



There's a video of a Kenwood TS-830M 6146 final flashing over and another of a 900MHz transmitter failing spectacularly. Not to mention the (dead) wildlife that fell foul of live wires and high voltages (etc., etc.) The older pages are archived (links at the end of the main page) and one of

the entries for 2012 is an ECU from a Porsche Boxter after it has been for a swim in the flooded pond at Finchingfield (at least that's where it looks like to me).

[www.microwaves101.com/encyclopedias/microwave-mortuary](http://www.microwaves101.com/encyclopedias/microwave-mortuary)

Look it up and see if there is anything you recognise... **Ed.**



## Value for money?

As everyone knows, you get what you pay for. I bought a couple of 3.5mm stereo extension cables for the PC-monitor audio link some time ago from the £1 shop and they have worked OK, as well as being very compliant and easy to form.

I had one as a spare in my drawer so when I wanted to connect a new paddle keyer to the radio, it wasn't much of a hardship to cut the lead and sacrifice half of it.

When I cut it, I was expecting to see a couple of miniature coax cables or a pair of plastic coated leads and a common screen.

What it contained, however, was three strands of 0.2mm enamelled copper wire in three colours to aid identification. It wasn't worth trying to make those mechanically stable at the keyer end, so I consigned the two halves to the bin. **Ed.**





## Booklet printing

I have long been an advocate of A5 booklet printing, rather than using loose leaf A4 size, as it reduces the amount of paper and ink used at home. A5 booklets are more easily stacked on bookshelves, they are neater to handle and generally more convenient. This presupposes, of course, that the source material is suitable for rendering in this size and that the text will still be rendered adequate to read - something that is important at my time of life!

There is good reason to use the technique to print a) if you want to archive a magazine (or any other large document you want to keep) and b) if your printer has the capability. The printing is easy, but you will probably have to fold and staple manually unless you have access to an all-singing, all-dancing "proper" printer that does it all for you! Most people don't have access to a long-arm stapler, including me, so here's how I keep it all neat:

1) That stapler will not fit!



2) Find a piece of cork or an eraser to act as a cushion and open your stapler out.

3) Place the cushion under the fold in the paper and then the opened stapler over the fold at the point where the staples are ejected.



4) Staple through to the cushion



5) Pull the pages off the cushion, turn the paper over and fold in the staple ends.

## Top tips

Got any top tips to share? You know where to send them! [editor@g0mwt.org.uk](mailto:editor@g0mwt.org.uk)

6) Repeat as necessary for the finished article.

